

The Office Action

The Examiner required the submission of a document (UK0302862.8 02/07/2003) for the purpose of claiming foreign priority.

The Examiner required affirmation of the election of Claims 1-23 and 25 under 35 USC 121.

The Examiner rejected claims 1-23 and 25 under 35 U.S.C. § 102(b) as being anticipated by MacMillan et al WO97/45507 ("Macmillan").

Applicant respectfully request that the Examiner reconsider the rejection in view of the below remarks.

REMARKS

As required by the Examiner, Applicant submits the document (UK0302862.8 02/07/2003) for the purpose of claiming foreign priority.

As required by the Examiner, Applicant hereby affirms the election of Claims 1-23 and 25.

Applicant respectfully submits that original claims 1-23 and 25 are not anticipated by MacMillan.

First, Applicant submits that the Examiner's reliance on U.S. 4,874,395 and GB 1,055,337 renders the rejection a combination of teachings and hence a 35 U.S.C. 103 rejection. Accordingly, a basis for the combination is required and has not been provided. Further, what these documents teach in their entirety must be considered. The following comments evidence that when the relied upon references are considered in totality, the skilled artisan would not arrive at the presently claimed invention.

Structures #1-3 are intentionally excluded from US 4,874,395

The Examiner relied on US 4,874,395, which is described in Paragraph 2, Page 2 in Macmillan.

First, it is clearly indicated by Macmillan that amine was used to "neutralise residual acid groups". As such, structures #1-3 are intentionally excluded from US, 4,874,395.

In this paragraph, Macmillan also clearly admits that “acid groups are not present in the compounds of the present invention”.

GB 1,055,337

The Examiner relied on GB 1,055,337, which is described in Paragraph 4, Page 2 in Macmillan.

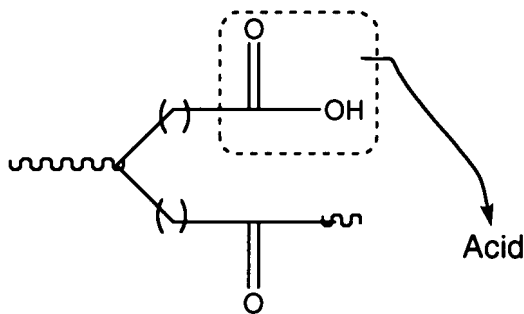
First, Claim 1 requires a method of producing a fuel composition. GB 1,055,337 is not about a fuel composition. It is about lubricant. Substituted succinic acid esters are not disclosed as being corrosion inhibitors. Indeed it is stated that they are adapted for use in combination with corrosion-inhibiting additives. Rather, they are tested as detergent additives.

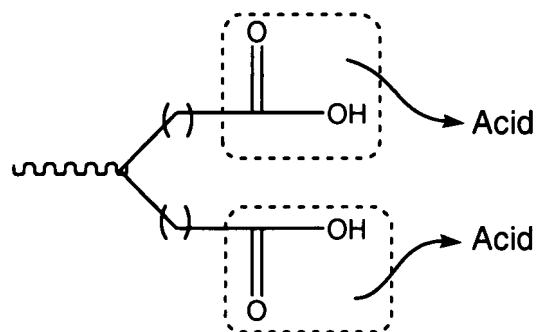
Moreover, this paragraph clearly indicates that the compounds are only oil-soluble esters. Structures #1-3 are not disclosed in this paragraph.

In Claim 1, the inhibitor is the following:

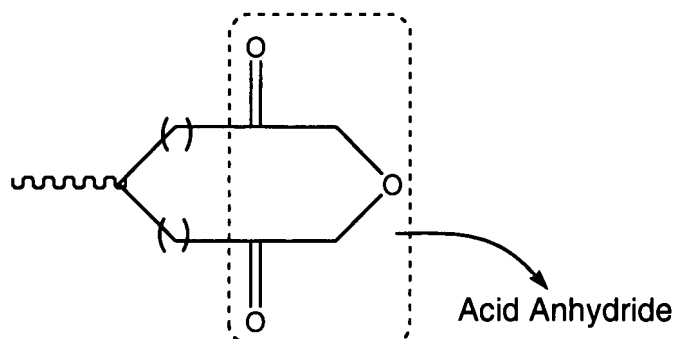
“either R_2 is OR_4 and R_3 is OR_5 , wherein R_4 and R_5 are selected from hydrogen and hydrocarbyl-OH and wherein at least one of R_4 and R_5 is hydrogen; or R_2 and R_3 together represent -O-”.

If the underlined elements are depicted by chemical formulas, the inhibitor in Claim 1 has one of the following three structures:





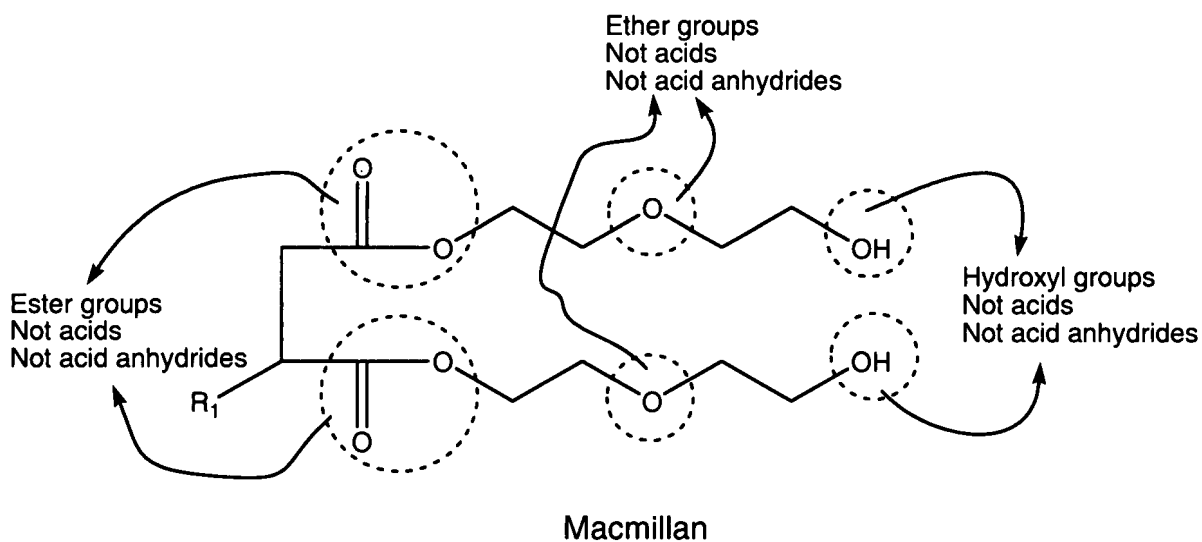
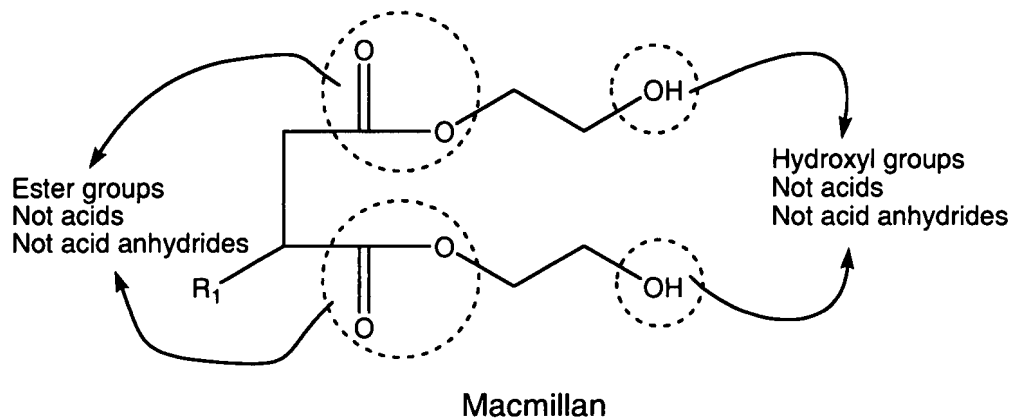
Structure #2



Structure #3

Structure #1 is not disclosed in Macmillan

Paragraph 2 on Page 3 of Macmillan teaches that his "novel compounds" are represented by for example:



The Macmillan disclosure has no acid group.

Structure #2 is not disclosed in Macmillan

For the reason articulated above, the Macmillan disclosure has no acid group.

Structure #3 as inhibitor is intentionally excluded from Macmillan

The acid anhydride in Macmillan is used as a starting material for the preparation of the diester inhibitor, not as an inhibitor per se. (Please see column 3, lines 12-25 of Macmillan).

In fact, Macmillan does not intend to include the acid anhydride in the fuel additive. As explained below, the reaction conditions disclosed in Macmillan were designed to exhaust all the acid anhydride groups to produce the diester inhibitor of formula (I).

In the Office Action, the Examiner relies on Example D to support the rejection. Using this example we illustrate how all the acid anhydride groups were completely consumed in the reaction. In Example D, the reaction was:



Wherein:

A is 358g polyisobutenylsuccinic anhydride;

B is 372g ethylene glycol;

C is the diester inhibitor; and

D is water.

(1) The molar ratio B:A was much higher than 2:1

Because polyisobutenylsuccinic anhydride in Example D was “prepared” “in the same manner as” Example B, and in Example B, 50g maleic anhydride was used with 200g polyisobutylene. The molecular weight of maleic acid is 98 g/mol. Therefore, the molar amount of A can be estimated as:

$$358g \times 50g / (200g + 50g) \div 98 \text{ g/mol} = 0.73 \text{ (mol)}$$

In contrast, the molar amount of B was:

$$372g \div 62 \text{ g/mol} = 6$$

(The molecular weight of ethylene glycol is 62 g/mol.)

As $6 \div 0.73 = 8.2$, the molar ratio B:A was 8.2:1, which is much higher than 2:1. A skilled artisan will understand that such an excess of reactant B, ethylene glycol, was intended to push the reaction forward and exhaust the reactant A, polyisobutenylsuccinic anhydride.

(2) Continuous removal of by-product water

In Example D, the product water was continuously removed from the reaction mixture. A skilled chemist knows that, if the concentration of a reaction product is kept at zero, the reactant will be completely exhausted.

When [D] approaches to zero:

$$[A][B]^2/[C][D]^2 \approx \infty$$

This infinite value was too far away from the equilibrium state of the reaction, and the reaction was therefore thermodynamically driven to the exhaustion of reactant A.

(3) The reaction was conducted "at 170-190°C for 12 hours".

These strong reaction conditions in Example D kinetically guaranteed that polyisobutenylsuccinic anhydride was rapidly and completely converted to the diester product.

In short, Applicant submits that neither U.S. 4,874,395 nor GB 1,055,337 support the rejection as asserted by the Examiner. Furthermore, as evidenced by Applicant, Macmillan is not itself overlapping with the present claims.

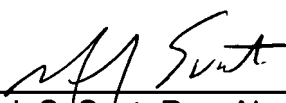
CONCLUSION

For the reasons detailed above, it is respectfully submitted all claims remaining in the application (Claims 1-23 and 25) are now in condition for allowance.

Respectfully submitted,

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11/9/07
Date


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